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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/058,670	01/28/2002	Salvador P. Umotoy	A4096/T44300	3837
32588	7590	12/11/2003	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			LUND, JEFFRIE ROBERT	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 12/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/058,670	<b>Applicant(s)</b> UMOTOY ET AL.	
	<b>Examiner</b> Jeffrie R. Lund	<b>Art Unit</b> 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 20-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 and 29-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                      | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                             | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>1/28/02</u> | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election of Group I, claims 1-19 and 29-35 in the Paper filed October 23, 2003 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the hole having a substantially hour-glass shape must be shown or the feature(s) canceled from the claims 8, 17, and 33. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 31-1 through 31-3 (page 7 line 7). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Specification***

4. The disclosure is objected to because of the following informalities: on page 6 line 16 and on page 9 line 6 "application Serial No. 06/287,280" should read

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--Provisional Application Serial No. 60/287,280-- and be further amended to include the current Application Serial No., and the publication number.

Appropriate correction is required.

***Claim Objections***

5. Claim 7 is objected to because of the following informalities: in line 5 "on" should read --an--. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. Claims 8, 17, and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 8, 17, and 33 all contain the limitation "the hole having a substantially hour-glass shape" does not particularly point out and distinctly claim the shape of the hole, because the claim does not specify the axis of the cross-section that is shaped like an hour-glass (i.e. along the axis of the hole or perpendicular to the axis of the hole).

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section

351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Diem et al, US Patnet 4,817,557.

Diem et al teaches an apparatus that includes: a chemical vapor deposition processing chamber 16; an ampoule vaporizer 90 fastened to the chamber, configured to convert tungsten hexacarbonyl to a vapor and deliver the vapor to the chamber 16; and a mass flow controller 98 fixed to the chamber and connected to the vaporizer. (Figure 2)

9. Claims 10-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al, US Patnet 6,572,706.

Nguyen et al teaches an apparatus that includes: a chemical vapor deposition processing chamber; an ampoule vaporizer 358 fastened to the lid of the chamber, configured to convert a precursor to a vapor and deliver the vapor to the chamber; a mass flow controller 370 fixed to the chamber lid and connected to the vaporizer; and a mixing feature configured to receive the vapor from the mass flow controller, mix the vapor with one or more other gases, and deliver the resulting gas mixture to the chamber interior. (Figure 11, column 5 lines 34-67) The specific material vaporized is an intended use of the apparatus. The apparatus of Nguyen et al is inherently capable of vaporizing tungsten hexacarbonyl.

10. Claims 29-32 and 34 are rejected under 35 U.S.C. 102(a) as being anticipated by Umotoy et al, US Patent 6,302,965 B1.

Umotoy et al teaches a chemical vapor deposition apparatus that includes: a platform 14 configured to receive a wafer; and a funnel-shaped dispersion plate 20 configured to receive a gas mixture, containing tungsten hexacarbonyl, and direct the gas mixture toward a surface of the wafer in a uniform manner. The dispersion plate includes a body having a center axis, an input face, an output face, and a thickness between the faces, an input opening along the center axis in the input face for receiving the gas mixture, the input opening extending radially from the center axis to an output opening in the output face through which the gas mixture exits. The output opening has an angle of 70°. (Figure 1; column 5 lines 63-64)

11. Claims 29-32 and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Umotoy et al, US Patent 6,302,965 B1

The applied reference has a common assignee and inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Umotoy et al is discussed above.

12. Claims 29-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Ku et al, US Patent application Publication 2003/0019428 A1.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Ku et al teaches a chemical vapor deposition apparatus that includes: a platform 14 configured to receive a wafer; a funnel-shaped dispersion plate 20 configured to receive a gas mixture, containing tungsten hexacarbonyl, and direct the gas mixture toward a surface of the wafer in a uniform manner, and a face plate between the dispersion plate and the wafer. The dispersion plate includes a body having a center axis, an input face, an output face, and a thickness between the faces, an input opening along the center axis in the input face for receiving the gas mixture, the input opening extending radially from the center axis to an output opening in the output face through which the gas mixture exits. The output opening has an angle of 70°. (Entire document)

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1-4, 7, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diem et al in view of Umotoy et al.

Diem et al was discussed above.

Diem et al differs from the present invention in that Diem et al does not teach a mixing feature or a funnel-shaped dispersion plate.

Umotoy et al was discussed above and includes a mixing feature to mix gases and a funnel-shaped dispersion plate.

The motivation for adding the mixing feature of Umotoy et al to the apparatus of Diem et al is to enable the apparatus of Diem et al to supply a mixed precursor to enable the vaporized tungsten hexacarbonyl to be diluted in argon as taught by Umotoy et al (column 6 lines 4-9). The motivation for supplying the apparatus of Diem et al with a funnel-shaped dispersion plate is to more uniformly disperse the vaporized tungsten hexacarbonyl more uniformly which improves the uniformity of the deposited tungsten layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the mixing feature and funnel-shaped dispersion plate of Umotoy et al to the apparatus of Diem et al.

15. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diem et al and Umotoy et al as applied to claims 1-4, 7, and 14-16 above, and further in view of Ku et al, US Patent Application 2003/0019428 A1.

Diem et al and Umotoy et al differ from the present invention in that they do not teach a face plate between the dispersion plate and the wafer that is configured to present a uniform thermal profile so the wafer may be uniformly heated.



Ku et al teaches a CVD chamber that includes a funnel-shaped dispersion plate 34 and a face plate 32 between the dispersion plate and the wafer that is configured to present a uniform thermal profile so the wafer may be uniformly heated. (Figure 1; paragraph 0046 and 0053)

The motivation for adding the face plate of Ku et al to the apparatus of Diem et al and Umotoy et al is to provide the wafer with a uniform thermal profile to uniformly heat the wafer as taught by Ku et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the face plate of Ku et al to the apparatus of Diem et al and Umotoy et al.

16. Claims 8, 9, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diem et al and Umotoy et al as applied to claims 1-4, 7, and 14-16 above, and further in view of Strang, US Patent Application 2003/0019580 A1.

Diem et al and Umotoy et al differ from the present invention in that they do not teach that the dispersion plate's input opening has an hour-glass shape.

Strang teaches a gas injector that has an hour-glass shape (figure 1 paragraphs 0013-0020).

The motivation for making the dispersion plate's input opening of Diem et al and Umotoy et al an hour-glass shape is to choke the gas inlet and prevent pressure waves from propagating upstream and interfering or influencing the incoming flow as taught by Strang (paragraph 0014).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the dispersion plate input opening of Diem et al and Umotoy et al hour-glass shape as taught by Strang.

17. Claims 1-5, 7, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al in view of Umotoy et al.

Nguyen et al was discussed above.

Nguyen et al differs from the present invention in that Nguyen et al does not teach a funnel-shaped dispersion plate, or supplying tungsten hexacarbonyl to the processing chamber.

Umotoy et al was discussed above and includes a funnel-shaped dispersion plate, and supplying tungsten hexacarbonyl to the processing chamber.

The motivation for supplying the apparatus of Nguyen et al with a funnel-shaped dispersion plate is to more uniformly disperse the vaporized precursor more uniformly, which improves the uniformity of the deposited layer. The motivation for supplying tungsten hexacarbonyl to the vaporizer is to enable the apparatus of Nguyen et al to deposit a tungsten layer as taught by Umotoy et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add funnel-shaped dispersion plate of Umotoy et al to the apparatus of Nguyen et al, and to supply tungsten hexacarbonyl to the vaporizer of Nguyen et al.

18. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al and Umotoy et al as applied to claims 1-5, 7, 15, and 16 above, and further in view of Ku et al, US Patent Application 2003/0019428 A1.

Nguyen et al and Umotoy et al differ from the present invention in that they do not teach a face plate between the dispersion plate and the wafer that is configured to present a uniform thermal profile so the wafer may be uniformly heated.

Ku et al teaches a CVD chamber that includes a funnel-shaped dispersion plate 34 and a face plate 32 between the dispersion plate and the wafer that is configured to present a uniform thermal profile so the wafer may be uniformly heated. (Figure 1; paragraph 0046 and 0053)

The motivation for adding the face plate of Ku et al to the apparatus of Nguyen et al and Umotoy et al is to provide the wafer with a uniform thermal profile to uniformly heat the wafer as taught by Ku et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the face plate of Ku et al to the apparatus of Nguyen et al and Umotoy et al.

19. Claims 8, 9, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al and Umotoy et al as applied to claims 1-5, 7, 15, and 16 above, and further in view of Strang, US Patent Application 2003/0019580 A1.

Nguyen et al and Umotoy et al differ from the present invention in that they do not teach that the dispersion plate's input opening has an hour-glass shape.

Strang teaches a gas injector that has an hour-glass shape (figure 1 paragraphs 0013-0020).

The motivation for making the dispersion plate's input opening of Nguyen et al and Umotoy et al an hour-glass shape is to choke the gas inlet and prevent pressure waves from propagating upstream and interfering or influencing the incoming flow as taught by Strang (paragraph 0014).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the dispersion plate input opening of Nguyen et al and Umotoy et al hour-glass shape as taught by Strang.

20. Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umotoy et al in view of Strang, US Patent Application 2003/0019580 A1.

Umotoy et al was discussed above.

Umotoy et al differs from the present invention in that Umotoy et al does not teach that the dispersion plate's input opening has an hour-glass shape.

Strang teaches a gas injector that has an hour-glass shape (figure 1 paragraphs 0013-0020).

The motivation for making the dispersion plate's input opening of Umotoy et al an hour-glass shape is to choke the gas inlet and prevent pressure waves from propagating upstream and interfering or influencing the incoming flow as taught by Strang (paragraph 0014).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the dispersion plate input opening of Umotoy et al hour-glass shape as taught by Strang.

21. Claims 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Umotoy et al in view of Ku et al, US Patent Application 2003/0019428 A1.

Umotoy et al was discussed above.

Umotoy et al differ from the present invention in that Umotoy et al does not teach a face plate between the dispersion plate and the wafer that is configured to present a uniform thermal profile so the wafer may be uniformly heated.

Ku et al teaches a CVD chamber that includes a funnel-shaped dispersion plate 34 and a face plate 32 between the dispersion plate and the wafer that is configured to present a uniform thermal profile so the wafer may be uniformly heated. (Figure 1; paragraph 0046 and 0053)

The motivation for adding the face plate of Ku et al to the apparatus of Umotoy et al is to provide the wafer with a uniform thermal profile to uniformly heat the wafer as taught by Ku et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the face plate of Ku et al to the apparatus of Umotoy et al.

### ***Double Patenting***

22. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11

F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

23. Claim 6 and 19 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 13 of copending Application No. 10/134,206 (Ku et al) in view of Diem et al. Ku et al was discussed above. Ku et al differs from the present invention in that Ku et al does not teach a vaporizer for vaporizing tungsten hexacarbonyl. Diem et al teaches a vaporizer for vaporizing tungsten hexacarbonyl. The motivation for adding the vaporizer of Diem et al to the apparatus of Ku et al is to provide a means of supplying tungsten hexacarbonyl to the apparatus of Ku et al as required by Ku et al. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the vaporizer of Diem et al to the apparatus Ku et al.

This is a provisional obviousness-type double patenting rejection.

24. Claims 29-35 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 13 of copending Application No. 10/134,206 (Ku et al). Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 14 of Ku et al differs only in minor and obvious ways from the claims of the present invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

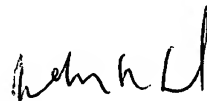
**Conclusion**

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art teaches the technological background of the invention.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (703) 308-1796. The examiner can normally be reached on Monday-Thursday (6:30 am-6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Jeffrie R. Lund  
Primary Examiner  
Art Unit 1763